REMARKS

Claims 1-34 are pending in the present Application. Claims 3, 15, 25 and 32 are amended and claims 20 and 28 are canceled by the present Amendment.

The Applicants respectfully request reconsideration of the Application in light of the foregoing amendments and the following remarks.

I. OBJECTION TO CLAIM 20

In paragraph 1 of the Office Action, claim 20 was objected to for failing to further limit the subject matter of a previous claim. The Applicants respectfully submit that claim 20 has been canceled, thereby rendering the objection moot.

II. THE CLAIMS ARE NOT INDEFINITE

In paragraph 2 of the Office Action, claims 1-24 were rejected under 35 U.S.C. 112, second paragraph as assertedly being indefinite. Specifically, it was asserted that the ordering of the components in independent claims 1 and 12 is unclear.

Claims 1 and 12 have been amended to clarify the ordering of the components. In claim 1, the means for removing water from the sample gas is recited to be downstream of the means for removing particulate matter and the at least one analyzer is recited to be downstream of the means for removing water. In claim 12, the NO_2 converter is recited to be downstream of the means for removing particulate matter, the means for removing water is recited to be downstream of the NO_2 converter, and the first analyzer is recited to be downstream of the means for removing water. Claims 2 and 22 have been similarly amended.

The Applicants respectfully submit that independent claims 1 and 12 as amended are not indefinite and that the rejection of claims 1-24 under 35 U.S.C. 112, second paragraph should be withdrawn.

III. THE CLAIMS ARE PATENTABLE OVER THE CITED ART

A. Paragraph 4 Rejection of Claims 1 and 8-10.

In paragraph 4 of the Office Action, Claims 1-3 and 7-9 were rejected under 35 U.S.C. 102(b) as assertedly anticipated by Lawson, U.S. Patent No. 4,073,619 (Lawson Patent). The Applicants respectfully traverse this rejection.

1. Claim 1

Claim 1 of the present Application is directed to an emissions monitoring system for monitoring constituent concentration levels in an emission stream flowing through a combustion source exhaust stack. The system comprises a sampling device for extraction of sample gas from the stack, a chamber positioned adjacent the stack, means for maintaining in the chamber interior a temperature above a dew point temperature of the sample gas and at least one sample gas line in fluid communication with the sampling device. At least a portion of the at least one sample gas line is disposed in the chamber interior. The system further comprises means for removing particulate matter from the sample gas, means for removing water from the sample gas downstream of the means for removing particulate matter, and at least one analyzer downstream of the means for removing water. Each of the at least one analyzer is configured for determination of a concentration level of a constituent in the sample gas.

2. The Lawson Patent

The Lawson Patent is directed to a method and system for sampling and transferring gas for analysis from a source of the gas to a gas analyzer remote from the gas source. Lawson Patent, col. 1, lines 39-47. According to this method, a relatively high gas transfer rate is achieved from the gas source along a relatively long first gas sampling duct into communication with a relatively short second gas sampling duct, and a relatively low gas transfer rate is achieved from the first gas sampling duct along the second gas sampling duct and thence to the gas analyzer. Id.

With reference to the single figure in the Lawson Patent, the system comprises a hood 11 that draws hot exhaust gases from a steelmaking vessel 10 into a waste gas duct 14. Lawson Patent, col. 1, line 67 to col. 2, line 1. A sampling probe 15 is set into the waste gas duct wall at a point which is close to the vessel, to reduce gas transit time. Lawson Patent, col. 2, lines 3-5. Waste gas sampled through the probe 15 passes along a first sampling duct 16 through a filter 17 and a cooler 18 to a vacuum pump 19. Lawson Patent, col. 9-19. In the filter fume particles are removed, and in the cooler the gas temperature is reduced to normal ambient temperature. Id. Beyond the pump 19 the sampled gas continues along the duct 16 at a positive pressure until the duct leads into an analysis room 20 some distance from the sampling point. Id. The duct 16 passes through the analysis room and the bulk of the sampled gas is exhausted to atmosphere at 24. Id.

A second sampling duct 25 branches from the first duct 16 within the analysis room and part of the sampled gas is drawn along the second duct 25 and through a further filter 26 by a pump 27. From the pump 27 the second sampling duct leads through a further cooler 28, to remove any residual moisture in the gas to three gas analyzers 31, 32, 33.

3. The Features of Claim 1 Are Not Disclosed by the Lawson Patent

The Applicants respectfully submit that the Lawson Patent does not disclose the features of claim 1. In particular, the Lawson Patent clearly does not disclose as part of its sampling system a chamber positioned adjacent the exhaust stack and means for maintaining the interior of the chamber above a dew point of the sample gas and wherein at least a portion of the sample gas line is disposed in the chamber interior.

It was suggested in paragraph 5 of the Office Action that the filter 17 of the system depicted in the Lawson patent is analogous to the chamber recited in claim 1. The Applicants respectfully submit that there is no basis for this suggestion in the Lawson Patent. The filter 17 could be nothing more than a screening element positioned across the duct. Moreover, even if there was a basis for assuming that the filter 17 may, in some way, be considered a "chamber," there is clearly no suggestion that this "chamber" is heated or otherwise has means for maintaining a chamber interior temperature above the dew point of the sample gas.

For at least these reasons, the Applicants submit that the Lawson Patent does not disclose the features of claim 1. The Applicants therefore respectfully submit that the rejection of claim 1 under 35 U.S.C. 102(b) should be withdrawn.

4. Dependent Claims 8-10

Claims 8-10 are dependent on claim 1, which has been shown to be patentable over the Lawson Patent. The Applicants submit that, because they include all the features of claim 1, claims 8-10 are also patentable over the Lawson Patent.

The Applicants therefore request that the rejection of claims 8-10 under 35 U.S.C. 102(b) be withdrawn.

B. Paragraph 5 Rejection of Claims 1, 8, 10, 12, 16, 20, 22-29 and 32

In paragraph 5 of the Office Action, claims 1, 8, 10, 12, 16, 20, 22-29 and 32 were rejected under 35 U.S.C. 102(b) as assertedly anticipated by Izumi, Japanese Patent No. JP 51-003289 (Izumi Reference). Claims 20 and 28 have been canceled thereby rendering their rejection moot. The Applicants respectfully traverse the rejection of claims 1, 18, 10, 12, 16, 22-27, 29 and 32.

1. The Izumi Reference

The complete Japanese text of the Izumi reference was provided by the Examiner along with an English language abstract. In order to facilitate this response, the Applicants have obtained an English translation of the Izumi reference (hereinafter referred to as "Translation"). A copy of the Translation is enclosed for the Examiner's convenience.

The Izumi Reference is directed to a system and method for accurate determination of trace amounts of nitrogen oxide (NOx) in exhaust gas. Izumi Reference English language Abstract. In the described methods, the NO_x present in the exhaust gas is first converted to NO_2. Translation, page 5, lines 11-13. The NO_2 is then determined directly or the NO_2 is reduced to NO, which is then determined quantitatively. Id.

More specifically, the methods of the Izumi reference involve oxidizing the NO_x present in exhaust gas with O_3 to form nitrogen pentoxide (N_2O_5) and nitric acid (HNO_3), which are then

pyrolyzed to form NO_2. Translation, page 5, lines 15-22. The amount of NO_2 formed in the exhaust gas is then determined quantitatively using a procedure that is not affected by the water present in the exhaust gas. Id. The Izumi reference discloses that in a particular embodiment, the NO_2 formed in the exhaust gas can be first reduced to NO, followed by dehydration. Translation, page 5, lines 11-13 and page 6, lines 1-4. In this embodiment, the amount of NO_x present in the exhaust gas can be determined by measuring the amount of NO with a common method, such as CLA, NDIR, or electrolysis at constant potential. Id.

The basic system for carrying out the methods of the Izumi Reference is shown in Figure 1. This system has a sampling probe 2 for receiving gas from an exhaust gas source 1. Translation page 11 and Figure 1. The gas is passed in sequence through a dust filter 3, a first pipeline 4, a pump 5, a second pipeline 6, a. flow meter 8, a third pipeline 9, an oxidation reaction tank 16, a fourth pipeline 17, a pyrolysis chamber 18, and a fifth pipeline 19. Id. In one embodiment, the gas is passed to a gas-sealed cell 20 where an NOx amount is determined based on UV absorption techniques. Translation page 5, lines 32, 33 and page 9, lines 15-33. Heating devices 22 consisting of a heater and insulation material is used to heat the pipelines 4, 6, 9 and the dust filter 3. Other heating devices 23, 24 are used to heat the oxidation reaction tank 16 and the pyrolysis reactor 18. Translation, page 6, line 33 to page 7, line 2; page 8, lines 14-17; page 9, lines 5-7; and Figure 1.

In an optional embodiment, partially illustrated in Figure 4, the system UV cell 20 is replaced by an NO_2 converter 31 downstream of the pyrolysis chamber 18, a dehydration device 33 and CLA detector 34. Page 10, lines 16-24. The NO_2 converter 31 may be an Mo catalyst device operating in a temperature range of 350-450°C. Translation, page 10, lines 27-29. The dehydration

device may be an electronic cooling system that removes water that would be harmful to the CLA detector 34.

2. The Izumi Reference Does Not Disclose the Features of Claim 1

The features of claim 1 were discussed above. The Applicants respectfully submit that the Izumi Reference does not disclose the features of claim 1. In particular, the Izumi Reference does not disclose an emissions monitoring system comprising a chamber positioned adjacent the stack, means for maintaining in the chamber interior a temperature above a dew point temperature of the sample gas wherein at least a portion of a sample gas line is disposed in the chamber interior. At most, the Izumi Reference discloses a sampling probe that passes sample gas from a source to an adjacent heated or insulated dust filter. A pipeline receives the filtered gas and transfers it to other components downstream. There is no suggestion that the dust filter 3 is or comprises a chamber through which a portion of the sample gas line passes. Further, there is no suggestion of such a chamber in which the temperature is maintained above the dewpoint of the gas.

Claim 1 is further distinguished from the Izumi reference in that Izumi does not teach or disclose a system with means for removing water from the sample gas where said means for removing is downstream of and adjacent to the chamber adjacent the exhaust stack. Claim 1 clearly recites that the means for removing particulate matter, the temperature-controlled chamber and the means for removing water are in close proximity to each other and the stack.

The above differences between the claimed subject matter and systems similar to those of the Izumi reference are specifically addressed in the specification of the present Application.

Paragraphs 24 and 25 describe the specific shortcomings of prior art systems that require sample line and component heating in order to avoid condensation. The system of claim 1 avoids these problems by providing a single chamber that requires heating. At least a portion of the sample gas line and means for removing particulate matter are disposed in the chamber interior. Because the means for removing water from the sample gas is placed adjacent the chamber, no additional line-heating is required.

In contrast, the Izumi reference discloses a dehydration unit that is far downstream of the filter and has a variety of additional components and lines in between, each requiring individual heating mechanisms. Izumi clearly does not disclose means for removing water adjacent a chamber adjacent an exhaust stack.

For at least the above reasons, the Applicants submit that the Izumi Reference does not disclose the features of claim 1. The Applicants therefore submit that the rejection of claim 1 under 35 U.S.C. 102(b) should be withdrawn.

3. Claims 2, 8 and 10

Claims 2, 8 and 10 are dependent on claim 1, which has been shown to be patentable over the Izumi Reference. The Applicants respectfully submit that, by virtue of their dependency, claims 2, 8 and 10 must also be patentable over the Izumi Reference.

With respect to claim 2, the Applicants further point out that the Izumi reference does not disclose an NO_2 converter disposed in the interior of a temperature controlled chamber intermediate means for removing particulate matter and means for removing water, all of which

are in close proximity to the exhaust stack. This is illustrated by the need in the Izumi system for additional heating equipment between the dust filter and the NO_2 converter.

With respect to claim 8, the Applicants submit that the Izumi Reference does not disclose the use of a sample probe having means for cooling the sample gas.

With respect to claim 10, the Applicants submit that the Izumi Reference does not disclose means for removing particulate matter that is disposed in a temperature controlled chamber capable of also enclosing an NO_2 converter. The Izumi Reference discloses nothing more than a filter with a separate heating/insulation device.

For at least these reasons, the Applicants respectfully request that the rejection of claims 2, 8 and 10 under 35 U.S.C. 102(b) be withdrawn.

4. Claim 12

Independent claim 12 recites all the feature of claim 1 along with the additional features that the means for removing particulate matter and an NO_2 converter are disposed in the chamber interior. The Applicants thus submit that claim 12 clearly further distinguishes the Izumi Reference and that the rejection of claim 12 under 35 U.S.C. 102(b) should be withdrawn.

5. Claim 16

Claim 16 is dependent on claim 12, which has been shown to be patentable over the Izumi Reference. The Applicants respectfully submit that, by virtue of its dependency, claim 16 must also be patentable over the Izumi Reference. The Applicants further point out that the Izumi Reference does not disclose the use of a sample probe having means for cooling the sample gas.

For at least these reasons, the Applicants respectfully request that the rejection of claim 16 under 35 U.S.C. 102(b) be withdrawn.

6. Claim 22

Independent claim 22 recites an emissions monitoring system comprising a sampling device for extraction of sample gas, a chamber positioned adjacent the stack, a chamber heater disposed in the chamber interior, at least one sample gas line with a portion of the gas line disposed in the chamber interior, a filter disposed adjacent the stack, the filter being in fluid communication with the at least one sample gas line, a dryer disposed adjacent the chamber in fluid communication with the at least one sample gas line and at least one analyzer in fluid communication with the at least one sample gas line downstream of the dryer.

The Applicants submit that the Izumi Reference does not disclose the features of claim 22. As noted above, the Izumi Reference does not disclose or suggest a system with a sample gas line at least partially disposed in a heated chamber adjacent the stack.

The Applicants note that the Izumi reference discloses the use of some form of heating equipment disposed around certain elements of the systems of Figures 1 and 4, but there is clearly no suggestion that any of the heated elements would constitute a chamber with an interior in which a heater may be disposed as is recited in claim 22.

As also noted above, the Izumi Reference does not disclose a system with a dryer downstream of and adjacent to the chamber adjacent the exhaust stack. Claim 22 clearly recites that the filter, chamber and dryer are in close proximity to each other and the stack.

For at least the above reasons, the Applicants submit that the Izumi Reference does not disclose the features of claim 22. The Applicants therefore submit that the rejection of claim 22 under 35 U.S.C. 102(b) should be withdrawn.

7. Claims 23 and 24

Claims 23 and 24 are dependent on claim 22, which has been shown to be patentable over the Izumi Reference. The Applicants respectfully submit that, by virtue of their dependency, claims 23 and 24 must also be patentable over the Izumi Reference. The Applicants therefore respectfully request that the rejection of claims 23 and 24 under 35 U.S.C. 102(b) be withdrawn.

8. Claim 25

Claim 25 recites a method of monitoring a concentration level of NO_x in an exhaust stream from a combustion source. The method comprises capturing sample gas, cooling the sample gas to a temperature below about 350 °F but above a dew point temperature of the sample gas, converting NO_2 in the cooled sample gas to NO by passing the sample gas through a catalytic NO_2 converter, removing water from the sample gas by passing the gas through a dryer and determining a sample gas NO concentration level.

The method of the Izumi Reference is fundamentally different from the method of claim 25. The Izumi method involves oxidation of NO_2 in the exhaust gas followed by thermal decomposition (pyrolysis). In the disclosed optional variation of the Izumi method, the NO_2 in the resulting gas is then converted to NO using an Mo converter. During conversion, the gas is maintained at a temperature between 350°C and 450°C, which is far higher than the temperature range recited in claim 25.

In the method of claim 25, the gas from the probe is cooled to a temperature below 350°F but above the dew-point of the gas. The cooled gas is then passed through a converter to convert the NO_2 in the gas to NO. After that, the gas is passed through a dryer and the NO concentration level is determined.

The Applicants note that the system disclosed in Figures 1 and 4 of the Izumi Reference requires heating of the various processing components and the lines connecting them. A significant advantage of the methods and systems of the present invention is the elimination of the need to heat the sample gas lines after passage through the converter, which is located in close proximity to the sampling probe. Application, paragraphs 28 and 40.

For at least the above reasons, the Applicants submit that the Izumi Reference does not disclose the features of claim 25. The Applicants therefore request that the rejection of claim 25 under 35 U.S.C. 102(b) be withdrawn.

9. Claims 26, 27 and 29

Claims 26, 27 and 29 are dependent on claim 25, which has been shown to be patentable over the Izumi Reference. The Applicants respectfully submit that, by virtue of their dependency, claims 26, 27 and 29 must also be patentable over the Izumi Reference. The Applicants therefore respectfully request that the rejection of claims 26, 27 and 29 under 35 U.S.C. 102(b) be withdrawn.

10. Claim 32

Like claim 25, claim 32 recites a method of monitoring a concentration level of NO_x in an exhaust stream from a combustion source. The method comprises capturing sample gas from

the exhaust stream using a sample gas probe, cooling the sample gas to a temperature below about 350 °F but above a dew point temperature of the sample gas, removing particulate matter from the cooled sample gas, converting NO_2 in the cooled sample gas to NO by passing the sample gas through a catalytic NO_2 converter, cooling the sample gas to a temperature sufficient to cause water in the sample gas to condense out of the sample gas, and determining a sample gas NO concentration level. The step of converting NO_2 precedes the step of cooling the sample gas to a temperature sufficient to cause water in the sample gas to condense out of the sample gas.

The Applicants respectfully submit that, for at least the reasons provided above with respect to claim 25, the Izumi Reference does not disclose the features of claim 32. In particular, the Izumi Reference does not disclose cooling the sample gas to a temperature below about 350 °F but above a dew point temperature of the sample gas and converting NO_2 in the cooled sample gas to NO by passing the sample gas through a catalytic NO_2 converter.

The Applicants therefore respectfully request that the rejection of claims 26, 27 and 29 under 35 U.S.C. 102(b) be withdrawn.

C. Paragraph 7 Rejection of Claims 6, 7, 17 and 18

In paragraph 7 of the Office Action, claims 6, 7, 17 and 18 were rejected under 35 U.S.C. 103(a) as being assertedly unpatentable over the Izumi Reference in view of Yamaki, U.S. Patent No. 4,073,866 ("Yamaki Patent"). The Applicants respectfully traverse this rejection.

1. The Yamaki Patent

The Yamaki Patent is directed to a process for converting nitrogen dioxide into nitrogen monoxide that comprises bringing a gas containing nitrogen dioxide into contact with a reaction composition comprised of a carbide of a metal selected from the group consisting of chromium, molybdenum, tungsten, vanadium, titanium, tantalum, silicon and boron or a composite carbide of such metals. Yamaki Patent, col. 2, lines 5-12. The carbides used in this process convert NO_2 in various kinds of gas into NO. Yamaki Patent, col. 2, lines 27-34. The reaction may be carried out at an ordinary temperature, but is generally carried out within a proper temperature range of 100-350°C. By this reduction reaction, NO_2 is converted into NO, and at the same time, the metal carbide is converted into carbon monoxide or carbon dioxide and a metal oxide. Id.

2. The Cited References Do Not Disclose or Suggest the Features of Claims 6, 7, 17 and 18

As noted above the Izumi Reference does not teach, disclose or suggest the features of claims 1 and 12. In particular, the Izumi Reference does not teach, disclose or suggest an emissions monitoring system comprising a chamber positioned adjacent the stack and means for maintaining in the chamber interior a temperature above a dew point temperature of the sample gas wherein at least a portion of a sample gas line is disposed in the chamber interior. Further, the Izumi Reference does not teach, disclose or suggest a system with means for removing water from the sample gas where said means for removing is downstream of and adjacent to the chamber adjacent the exhaust stack.

The Yamaki Patent does not cure the deficiencies of the Izumi Reference with respect to claims 1 and 12. The Yamaki Patent is solely directed to a process for converting NO_2. There is no discussion of the use of the disclosed conversion process in specific combustion emission

monitoring systems. More particularly, there is no discussion of the placement of a converter using the disclosed process relative to other components in a combustion emission monitoring system.

The Applicants therefore submit that claims 1 and 12 are patentable over the combined teachings of the Izumi Reference and the Yamaki Patent.

Claims 6 and 7 are dependent on claim 1 and claims 17 and 18 are dependent on claim 12. Because claims 1 and 12 are patentable over the cited combination of references, the Applicants submit that claims 6, 7, 17 and 18 are also patentable over these references. The Applicants therefore request that the rejection of claims 6, 7, 17 and 18 under 35 U.S.C. 103(a) be withdrawn.

D. Paragraph 9 Rejection of Claims 3-5, 9, 13-15 and 19

In paragraph 8 of the Office Action, claims 3-5, 9, 13-15 and 19 were rejected under 35 U.S.C. 103(a) as being assertedly unpatentable over the Izumi Reference in view of the Lawson Patent. The Applicants respectfully traverse this rejection.

Claims 3-5 and 9 are dependent on claim 1, which has been shown to be patentable over both the Izumi Reference and the Lawson Patent. Claims 13-15 and 19 are dependent on claim 12, which has been shown to be patentable over the Izumi Reference.

For the reason discussed above, the Applicants submit that the combined teachings of the Izumi Reference and the Lawson Patent do not teach, disclose or suggest the features of claims 1 and 12. The Applicants further submit that, by virtue of their dependency on patentable claims, claims 3-5, 9, 13-15 and 19 are patentable over the cited combination of references.

For at least the above reasons, the Applicants request that the rejection of claims 3-5, 9, 13-15 and 19 under 35 U.S.C. 103(a) be withdrawn.

E. Paragraph 9 Rejection of Claims 11, 21, 30, 31, 33 and 34

In paragraph 9 of the Office Action, claims 11, 21, 30, 31, 33 and 34 were rejected under 35 U.S.C. 103(a) as being assertedly unpatentable over the Izumi Reference in view of Matsuda, U.S. Patent No. 3,977,836 ("Matsuda Patent") or in view of Burrows, U.S. Patent No. 5,739,038. The Applicants respectfully traverse this rejection.

1. The Matsuda Patent

The Matsuda Patent is directed to methods for determining ammonia concentration in a sample gas. An apparatus for analyzing ammonia is shown in Matsuda Figure 1. In this apparatus, a gas containing ammonia and a given amount of NOx is passed through flow rate regulating valve 1 and temperature regulator 2, and an NO x concentration is measured by NOx analyzer 3. Matsuda Patent, col. 5, lines 27-48. The ammonia and NOx in the gas then undergo a reaction in catalyst vessel 4 to form nitrogen and water. Id. An NOx concentration in the effluent gas after the reaction is then measured by NOx analyzer 5, and an ammonia amount contained in the gas before the reaction can be determined from a difference in NOx concentrations before and after the reaction. Id.

When no NOx or an insufficient amount of NOx is contained in the gas to be measured, it is necessary to add an NOx span gas to the gas. Matsuda Patent, col. 5, lines 49-55. Since the addition of the span gas changes a gas volume, an exact flow rate (ratio of flow rate of the sample gas to that of NOx span gas) of gas is determined for calibration of the gas volume. Id.

When the gas to be measured contains a small amount of NOx, an exact amount of ammonia can be determined by calculation of the measured values of NOx, using an apparatus for analysis having a structure as shown in Matsuda Figure 3. Matsuda Patent, col. 5, line 57 to col. 6, line 12. In this apparatus, NOx analyzer 31 and NOx span gas feeder 32 are added to the basic structure. Id. The process now includes measuring NOx concentration of the gas to be measured before and after the span gas addition, as well as after the catalyst reaction. The NOx concentration of the span gas is also known. Id. Ammonia concentration may then be determined from these measurements. Id.

2. The Burrows Patent

The Burrows Patent is directed to systems and methods for providing a spectroscopic analysis of a sample gas. Burrows Patent Abstract. A sample gas is spectrally analyzed and the analyzer outputs a signal indicative of a radiation intensity spectrum associated with the analyzed sample gas. Id. A processing unit uses the analyzer signal to detect the presence of one or more prescribed gases and to determine the concentration of each of the prescribed gases in the sample gas. Id. Next, the reacting agent is supplied to the sample gas to convert one or more gases whose presence in the sample gas cannot be detected via spectral analysis due to the masking effects other gases present in the sample gas. Id. The masked gases are converted to secondary gases at least one of which is readily detectable via spectral analysis. Id. The modified sample gas is spectrally analyzed, and the processing unit detects the presence of the masked gases and determines the concentration of each. Id. The system may be employed to monitor certain environmental gases contained within industrial emission. Id. In such a case, the prescribed

gases are nitrogen dioxide and sulfur dioxide, and the masked gases are nitric oxide, ammonia, and hydrogen sulfide. Id.

he Burrows Patent discloses a procedure for calibrating the spectral analyzer used in the practice of the disclosed methods. Burrows Patent, col. 9, lines 48-57. This procedure is used to check the operation of the analyzer 18 itself and to correct for any inaccuracies inherent therein." Id. (emphasis added). It is also used to determine the extent of the dilution effect caused by the introduction of a reacting agent into the sample gas, and to compensate for the dilution. Id. And finally, it can be employed to determine, and compensate for, the effects of the conversion process associated with the ammonia, nitric oxide, and hydrogen sulfide. Id.

To perform the full scale span check, the processing unit 20 closes the flow path between the zero gas supply 32 and the inlet node 30 and opens a flow path between the gas supply 34 containing a known quantity of nitrogen dioxide and the inlet node 30, using the calibration gas distribution node 36 (step 208). Burrows Patent, col. 9, line 58 to col. 10, line 9. In step 210, the processing unit 20 determines the concentration of the nitrogen dioxide present in the calibration gas via spectral analysis. Id. This determined concentration of nitrogen dioxide is then compared to the concentration known to exist in the calibration gas. Id. Any difference between the two concentrations is due to inaccuracy in the spectral analyzer 18. Id. If a difference does exist, the processing unit 20 calculates a correction factor for nitrogen dioxide in accordance with well known methods (step 212). Id.

3. The Cited References Do Not Disclose or Suggest the Features of Claims 11 and 21

As noted above the Izumi Reference does not teach, disclose or suggest the features of claims 1 and 12. In particular, the Izumi Reference does not teach, disclose or suggest an emissions monitoring system comprising a chamber positioned adjacent the stack and means for maintaining in the chamber interior a temperature above a dew point temperature of the sample gas wherein at least a portion of a sample gas line is disposed in the chamber interior. Further, the Izumi Reference does not teach, disclose or suggest a system with means for removing water from the sample gas where said means for removing is downstream of and adjacent to the chamber adjacent the exhaust stack.

The teachings of the Matsuda and Burrows Patents, even if combined, do not cure the deficiencies of the Izumi Reference with respect to claims 1 and 12. Neither of these patents discusses the placement of an NO_2 converter relative to other components in a combustion emission monitoring system.

The Applicants therefore submit that claims 1 and 12 are patentable over the combined teachings of the Izumi Reference and the Yamaki Patent.

Claims 11 and 21 are dependent on claims 1 and 12, respectively. Because claims 1 and 12 are patentable over the cited combination of references, the Applicants submit that claims 11 and 21 are also patentable over these references.

The Applicants therefore request that the rejection of claims 11 and 21 under 35 U.S.C. 103(a) be withdrawn.

4. The Cited References Do Not Disclose or Suggest the Features of Claims 30 and 31

As noted above the Izumi Reference does not teach, disclose or suggest the features of claim 25. In particular, the Izumi Reference does not teach, disclose or suggest a method of monitoring a concentration level of NOx in a sample gas wherein the sample gas is cooled to a temperature below about 350 °F but above a dew point temperature of the sample gas and the NO_2 in the cooled sample gas is converted to NO by passing the sample gas through a catalytic NO_2 converter.

The Matsuda and Burrows Patents do not cure the deficiencies of the Izumi Reference with respect to claim 25. In the Matsuda Patent, conversion of NO_2 is carried out in a temperature range of 200-500°C. Matsuda Patent, col. 4, lines 65-67. The Burrows Patent does not disclose or suggest the use of a catalytic NO_2 converter.

The Applicants thus submit that claim 25 is patentable over the combined teachings of the Izumi Reference and the Matsuda and Burrows Patents. The Applicants further submit that, by virtue of their dependency on claim 25, claims 30 and 31 are also patentable over the cited combination.

The Applicants further submit that the combined teachings of the cited references do not disclose the steps of dependent claim 30. In particular, the combined teachings of the cited references do not disclose or suggest the step of determining an overall system bias.

For at least these reasons, the Applicants respectfully submit that the rejection of claims 30 and 31 under 35 U.S.C. 103(a) should be withdrawn.

5. The Cited References Do Not Disclose or Suggest the Features of Claims 33 and 34

Claim 33 recites a method of monitoring a concentration level of a constituent in an exhaust stream from a combustion source. The method comprises capturing sample gas from the exhaust stream using a sample gas probe, cooling the sample gas to a temperature below about 350 °F but above a dew point temperature of the sample gas, removing particulate matter from the sample gas, removing water from the sample gas by passing the sample gas through a dryer, measuring a sample gas flow rate downstream of the dryer, determining a sample gas constituent concentration level, introducing a span gas having a known span gas constituent concentration level into the sample gas to form a combined sample and span gas flow, measuring a combined sample and span gas flow rate downstream of the dryer, determining a combined sample and span gas constituent concentration level and determining an overall system bias using the known span gas constituent concentration level, the sample gas constituent concentration level and the combined sample and span gas constituent concentration level.

The Applicants submit that the combined teachings of the Izumi reference and the Matuda and Burrows Patents do not teach disclose or suggest a method of monitoring a concentration level of a gas constituent that includes determining an overall system bias. For at least this reason, the Applicants respectfully submit that the rejection of claim 33 under 35 U.S.C. 103(a) should be withdrawn.

Because it is dependent on claim 33, the Applicants submit that claim 34 must also be patentable over the cited references. The Applicants therefore request that the rejection of claim 34 also be withdrawn.

IV. CONCLUSION

For at least the reasons set forth above, the Applicants respectfully submit that claims 1-19, 21-27 and 29-34 are in condition for allowance. The Applicants therefore request that the present application be allowed and passed to issue.

Should the Examiner believe anything further is desirable in order to place the application in even better condition for allowance, the Examiner is invited to contact the Applicants' undersigned representative.

Respectfully submitted,

David E. Baker
Attorney for Applicant
Registration No. 42,285
Telephone: (804) 788-8762
Facsimile: (804) 343-4598

Hunton & Williams
Riverfront Plaza, East Tower
951 East Byrd Street
Richmond, VA 23219
(804) 788-8762

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